Overview of Water Monitoring Plan in Response to the Gulf of Mexico

EPA's Current Sampling Objectives:

1. Establish pre-impact or background conditions. Future monitoring will assess the impact of the spill and phase in additional information on sediments and fish. EPA is focused on reporting oil-related contaminants (Volatile Organic Compounds, Semi-Volatile Organic Compounds, PAHs, and heavy metals).

2. Sampling locations include targeted sites identified as likely to be impacted by the spill and also a subset of National Coastal Condition Assessment (NCCA) sites.

3. The initiation and frequency of post-impact sampling will depend on when oil is anticipated to reach near-shore areas. We will also rely on other information provided by the Unified Command and other federal agencies, such as NOAA and USGS. The Regions have recently submitted a draft post-impact sampling plan for near-shore, offshore, and deep Gulf sampling.

Types of Samples and Compounds (and who is taking the samples):

1. One-time, near-shore, pre-spill surface water samples
   a. Collection: EPA and EPA contractors are collecting grab samples of water and sediment from near-shore areas. Multiple project teams have been deployed to multiple locations collecting surface water and sediment samples and collecting real-time water data utilizing multi-parameter water quality instruments. Additional sampling, to determine the presence of free oil globules and/or surface oil at near-shore surface water locations (i.e. within 100 feet of the shoreline), was conducted to characterize the oil and dispersant mixture that is reaching the shoreline. Further sampling along beaches, marshes, tidal flats, or other shoreline types was conducted to collect samples of fresh oil, mousse, tar, tarballs, and tar patties that had accumulated as part of the oil release. Samples are being analyzed for VOCs, SVOCs, metals (including mercury), TPH, oil and grease, toxicity in sediments, and total organic carbon.

      Region 6 is collecting surface water samples daily at targeted near-shore locations to establish pre-spill conditions. These baseline samples are being collected at different Louisiana locations, including west of the Mississippi Delta.

      Region 4 concluded collecting baseline samples as of May 6, 2010. Baseline samples were collected from targeted sites from Mississippi, Alabama, and Florida.

b. Instrumentation: Commercially-manufactured and EPA-approved Federal Reference Methods or Federal Equivalent Methods sampling per EPA guidance and rules.
    i. Inductively Coupled Plasma
    ii. Gas Chromatography Mass Spectrometry
    iii. Gas Chromatography Flame Ionization Detection
    iv. Cold Vapor Atomic Absorption Spectrometry

c. Analysis: Water samples are analyzed for oil-related chemical contaminants: Volatile Organic Compounds (e.g., toluene), Semi-Volatile Organic Compounds (e.g., phenol), Polycyclic Aromatic Hydrocarbons (e.g., benzo(a)pyrene), and Heavy Metals (e.g., Nickel). Future sampling will include parameters related to dispersants and alkylated PAHs. Toxicity testing will be included post-impact. The NCCA sampling will also include collection and analysis of contaminants in fish. Each chemical contaminant group requires a separate analytical method.

d. Detection Limits, varies by pollutant:
    i. VOCs: 0.41-9.9 ug/L
    ii. SVOCs (including PAHs): 0.041-6.7 ug/L
    iii. Metals: 0.0002-0.017 mg/L

e. Data turnaround time (total time 5-8 days):
    i. Collection time and ship to lab: 24 hours
    ii. Lab Analysis, varies by pollutant: 24-72 hours
    iii. Quality Assurance Review within lab: 24-48 hours
    iv. Lab sends results to Regional SCRIBE database and Regional Review: 24 hours
    v. HQ Contractors pull from SCRIBE.net, Office of Water reviews data and coordinates with PIO to post data to epa.gov/bpspill: 24 hours

2. Thresholds: The Office of Water compares the data for a list of 30 oil-related chemical contaminants against established Agency benchmarks, including:
    a) EPA Clean Water Act Section 304(a) criteria and EPA's Draft Equilibrium Partitioning Sediment Benchmarks

    b) When established EPA 304(a) criteria are not available, EPA calculates new screening benchmarks following one of three derivation methods:
        i. Ecotox Thresholds from the USEPA Superfund program
        ii. USEPA 304a criteria, 1985 Guidelines
        iii. USEPA Great Lakes Initiative Tier II Methodology.

iv. Baseline data from past NCCA (sampling 2000-2006) and post-Hurricane Katrina Sampling.

v. The Office of Water also compares water quality data against 304(a)-derived human health criteria.

Status of Results – Data Collection and Reporting Information

The Regional data on the EPA spill response website are current through the following dates as of COB May 17th.

Region 4:

- Pre-impact water sampling for VOCs, SVOCs, HM, and PAH were reported online for April 30-May 6.
- There were no values which exceeded EPA aquatic life or human health thresholds for contaminants related to oil.

Region 6:

- Pre-impact water sampling for VOCs, SVOCs, HM, and PAH were reported online for April 30-May 12.
- There were no values which exceeded EPA aquatic life or human health thresholds for contaminants related to oil.

Qualitative Description of What We Know

We do not expect to find significant levels of VOCs, SVOCs, metals, PAHs or other parameters in any baseline, pre-impact water sampling. We have not seen any incremental levels of these substances over our benchmarks.

Qualitative Description of What We Don't Know

We do not know when the oil/dispersant plume will reach the estuaries and shoreline. Additionally, we do not know if the dispersants will reach shore.

We do not know the target analytes for the dispersant, nor the methods needed to analyze samples. Thus, we also do not know the exact amount of time that would be required to analyze and conduct QA/QC.

NOT FOR EXTERNAL PUBLICATION

Sampling and Monitoring Technical Q&A

Q. How do you determine if the application of dispersants is effective?

A. Subsurface water monitoring will be performed following dispersant application in order to provide the best scientific information possible. Some of the monitoring parameters include: 1) identification of dispersed oil, 2) oil droplet size, 3) dissolved oxygen (DO) and other physical characteristics such as conductivity, temperature and depth (CTD) and, 4) toxicity information.

Q. How do scientists identify if the oil is dispersed?

A. Monitoring of oil will be performed using a number of different fluorometers that enable us to determine where the oil plume is located (or the chemical "signature" of the oil) and whether the oil is being broken down chemically (from the use of dispersants) or physically by natural means such as wave action or underwater mixing.

Fluorometers measure fluorescence which helps scientists locate dispersed oil plumes in the water column. Fluorescence is technically defined as the absorption of light of a certain wavelength (typically ultraviolet) that induces the emission of light with a longer wavelength (and lower energy). To measure fluorescence, fluorometers expose a chemical or compound to a specific wavelength in UV light range (similar to a black light). When the compound is exposed to the UV light, one of the chemical's electrons is "excited" by the light and jumps up to a higher wavelength and then back down to its normal state. When the electron drops down to its normal state it emits a "glow" or "fluorescence." The fluorometer measures the emitted light or "fluorescence," which allows scientists to identify certain compounds in the oil and, under certain circumstances, even the effectiveness of the dispersant application.

Q. Why do scientists measure oil droplet size?

A. By determining the size of the oil droplets, scientists can potentially distinguish between dispersed and non-dispersed oil. Droplet size can also help scientists determine if the oil is being broken up chemically via the dispersants or if its physically being broken up by wave action or wind. Droplet size also helps scientists evaluate how quickly the oil droplet rise through the water column.

Q. How do scientists measure oil droplet size?

A. Oil droplet size is determined by means of a laser-induced particle size analyzer. This instrument uses a laser which hits the particles, or droplets, in the water column and scatters the light. The scattered light information is collected on a detector which provides real-time instant results to scientists.

Q. What is dissolved oxygen (DO) and why would dispersant application monitoring be stopped if DO levels dropped?

A. Dissolved oxygen (DO) analysis measures the amount of gaseous oxygen (O_2) dissolved in the water. Adequate dissolved oxygen is necessary for good water quality. Normal ranges for DO in the Gulf area are 4 mg/l. The lower the concentration of dissolved oxygen, the greater the stress is on aquatic life. The evaluation criteria to determine further use of subsea dispersant include DO levels that are < 2mg/l and the results of toxicity tests.

Q. The monitoring and assessment directive calls for the use of a "CTD rosette." What is a CTD rosette?

A. The "rosette" is a cylindrical piece of equipment that holds multiple specialized water bottles that can take separate water samples at different depths every time it goes in the water. The rosette is deployed and lowered a specific depth and then brought back to the surface. On its way to the surface, the water bottles will be "fired" at certain depths, thus trapping water from that depth inside the bottle ready to be sampled on deck.

The CTD is a set of small high-tech probes attached to the rosette and is the primary tool for understanding the physical properties of sea water that are essential for supporting marine life. C stands for "Conductivity," T stands for "Temperature," and D stands for "Depth". A CTD gives scientists an accurate and comprehensive charting of the distribution and change in water temperature, salinity, and density for the water column they are studying. While the CTD is still underwater it reports electronic messages through a cable back to the onboard computer lab. While the CTD is gathering data underwater, computers on the ship are constantly receiving and analyzing the data.

Information about Dispersants and Toxicity Testing:

Q. What is a toxicity test?

A. Toxicity tests are methods for determining the impact of a chemical or an effluent on living organisms and measure the degree of response using commonly tested species. Many different kinds of tests can be used to identify potential toxic effects but since toxic effects differ, comparing the toxicity of one to another may not be appropriate.

Q. What is an LC50?
A. In environmental studies, LC stands for "Lethal Concentration" and is the concentration of the chemical, given all at once, in the water that causes the death of 50% of a group of test animals in a given time (for example, during a 96-hour period). In general, the smaller the LC50 value, the more toxic the chemical. The opposite is also true: the larger the LC50 value, the lower the toxicity. For example, a chemical with an LC50 of 2 parts per million (ppm) would be more toxic than a chemical with an LC50 of 20 ppm. The LC50 is the measure of the immediate (or acute) toxicity of a chemical for

the particular animal species being tested. The LC50 was not designed nor intended to give information on the long-term exposure effects of a chemical.

It is also important to note that the LC50 value may be different for a given chemical depending on the route of exposure (e.g., skin contact, ingestion, inhalation) and can be different for different animal species, ages and sexes. The LC50 is only one source of toxicity information and only provides information for the species and concentrations of chemical being tested under laboratory conditions. Toxicity tests resulting from controlled laboratory experiments may not accurately represent the degree of toxicity seen in the environment because of factors such as breakdown of the chemical, different species, different routes of exposure, age, sex, stage of development (e.g., adult versus larval).

Q. What types of toxicity tests are required to monitor the biological impacts of subsurface dispersant application?

A. The biological impacts of dispersants applied under water will be monitored using a test that evaluates the potential toxicity of sediment underwater. The toxicity of potentially contaminated sediment is determined through tests that measure the immediate survival of microscopic, water dwelling organisms called rotifers. A commercially-available procedure (Rototox®) is used and is specified for the BP dispersant monitoring directive because it is rapid and can be performed remotely on a ship.

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Sent: 05/16/2010 03:33 PM AST

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Subject: Follow up On BP spill and government testing/disclosure

Mathy:

Thank you for sharing the deep sea dispersant plans. We are deeply dissatisfied that BP is in charge of environmental testing, that none of the data being talked about is being disclosed to the public, and that the government appears to be evading rather than aggressively monitoring and reporting on the impact of dispersed oil on marine life. Here is the information that we have been able to surmise to date:

Deep sea dispersants: The dispersant testing protocol made available relies exclusively on BP testing and reporting to the government. Decisions have been made to move forward with the deep-sea dispersants. How is this testing information been made public? Why is the government relying on BP to do the testing? Environmental testing is clearly a government responsibility.

Surface dispersants: I haven't seen the protocol you mentioned on surface dispersants. We are most concerned with the impact of dispersed oil on marine life. Here is what was said in the dispersant Q&A: "The harm or toxicity of dispersed oil in the environment is generally associated with the oil rather than with the dispersant alone. However, use of dispersants breaks up a slick of oil on the surface into smaller droplets that can go beneath the surface. When applied on the surface before spills reach the coastline, dispersants will potentially decrease exposure for surface-dwelling organisms (such as sea birds) and intertidal species (such as mangroves and salt marshes), while increasing exposure to a smaller population of aquatic life found deeper in the water. It is unknown if dispersed oil has toxic implications to the human population because bioaccumulation through the food chain has not been evaluated." What is the basis of the conclusion that dispersed oil affects "a smaller population" because it's underwater? All life in the Gulf depends on the underwater ecosystem. Hundreds of square miles in the affected region are less than 20 feet deep. This statement seems to be a vague reassurance when the reality is we either don't know the impact of this grand experiment or the testing data isn't being disclosed. Why is the government downplaying the damage being done beneath the water's surface?

Seafood Testing: Where are the testing of seafood toxicity being made public? "The Federal and State governments have strong systems in place to test and monitor seafood safety and to prohibit harvesting from affected areas, keeping oiled
products out of the market. NOAA Fisheries is working closely with the U.S. Food and Drug Administration and the States to ensure seafood safety. If managers determine that seafood may

be affected, the next step is to assess whether seafood is tainted or contaminated to levels that could pose a risk to human health through consumption. NOAA conducts a combination of both sensory analysis (of tissue) and chemical analysis (of water, sediment, and tissue) to determine if seafood is safe following an oil spill. The results will be made pubic as soon as possible."

Natural resources damage assessment: The last public update on May 7 had no useful information on damage assessment other than a process note that they are working with BP. We are nearly a month into this spill. Why are we relying on the liable party (BP) for information on damages? Why is there no meaningful information being provided to the public? What is the schedule for testing and information for this or the new NOAA analysis team that was recently dispatched? thttp://response.restoration.noaa.gov/book_shelf/1959_deepwater-Horizon-NRDA-ORR-web-5-7-10.pdf

EPA: EPA's website only says that "Nearshore water sampling conducted through May 10, 2010, found that water quality does not pose increased risk to human health or aquatic life". And "Sediment samples taken through May 10, 2010, indicate that there may be risks to aquatic life from pollutants in sediment at some locations. It is unknown whether the sediment contamination resulted from the BP Spill or was already present." Does EPA believe this is an adequate assessment of the environmental condition of the Gulf?

Toxicity: Fishermen volunteers are beginning to report toxic effects and this weekend are calling for dispersant use to be cancelled and adequate protection gear to be provided. What is the government doing to protect people who come in contact with oil, dispersed oil and guide them on protective gear? BP is not handling this responsibility and providing the extensive gear that EPA says is needed.

I know this is quite a list, but our level of concern is deepening over time and we are not satisfied with the public information being provided by EPA, NOAA and the administration.

Jeremy

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Water Analysis Timeline from Sample Collection to Internet Posting of Results

Sample Step	Step 1	Step 2	Step 3						Step 4	Step 5		Step 6	Step 7	Step 8	
Action	Collection Time	Ship to Lab	Analysis	Parameter	Parameter Example	Lab Method	Lab Method Analysis Time	Lab Method Instrument Description	Quality Assurance Review Time within Lab*	Lab Send Results to Regional SCRIBE Database	Regional Review and Send to SCRIBE.Net	HQ Contractors pull from SCRIBE.Net	Office of Water Reviews Data and Work with PIO	EPA Posts Data on Internet	Total Time to Post Data
Sample Time	0	24 hrs	24-72 hrs						24-48 hrs	24 hrs		24 hrs			5-8 Days
Water, Sediment				BTEX(Benzene, Toulene, Ethylbenzene, Xylenes)	Benzene	EPA SW 5035	24 hours	Inductively Coupled Plasma							
Water, Sediment				Diesel Rnage Organics	Diesel fuel	EPA SW 8015	24 hours	Gas Chromatography Mass Spectrometry							
Water, Sediment				Gasoline Range Organics	Gasoline	EPA SW 8015	24 hours	Gas Chromatography Mass Spectrometry							
Water				Mecrury	Mercury	EPA 7470	24 hours	Gas Chromatography Flame Ionization Detection							
Sediment				Mecrury	Mercury	EPA 7471	24 hours	Gas Chromatography Flame Ionization Detection							
Water, Sediment				Metals	Nickel	EPA 6010	24 hours	Gas Chromatography Flame Ionization Detection							
Water, Sediment				Semivolatile Organic Compounds including Polycyclic Aromatic Hydrocarbons	Phenol, Benzo(a)pyrene	EPA 8270C	72 hours	Cold Vapor Atomic Absorption Spectrometry							
Water, Sediment				Volatile Organic Compounds	Toluene	EPA SW 8260B	24 hours	Cold Vapor Atomic Absorption Spectrometry							
Water, Sediment				Alykal PAHs	TBD	TBD	TBD	TBD							
Water, Sediment				Dispersant chemicals	TBD	TBD	TBD	TBD							

* NOTE - Laboratories conduct Quality Assurance on the results to ensure that data have been recorded accurately. Sometimes, the reviewer may find an anomalous value that requires addition review time. When this happens, the QA reviewer examines all the information to determine if the result is valid. It is essential for the reviewer to take the extra time to ensure the data are accurate and meaningful.